INFECTION AFTER ABDOMINAL OPERATIONS, AND ITS TREATMENT

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IT is a well-recognized fact that the honest student in any subject often learns less from his successes than from his mistakes. Among the many benefits which the science of bacteriology has given to us is to be reckoned the power of determining definitely the true nature of certain processes which, during the life of the patient, were hidden from, and mistaken by, the clinician, and which formerly escaped the notice even of the most painstaking and careful pathologist.

Among these conditions are those which are the result of a septic infection which has not given rise to the characteristic symptoms of septicemia and in which death has often been regarded as having been due to shock, pneumonia, heart-failure, suppression of urine or some more or less intangible cause. This vagueness is now, thanks to the bacteriologist, becoming rarer every day; and if his decisions are not always conducive to the maintenance of the self-satisfaction of the operator, nevertheless they are to be received with submission, and the lessons taught by them should be taken to heart, in order that no avenue of danger may remain unguarded, and no time may be lost in rectifying, as far as possible, any untoward condition which directly or indirectly may have resulted from some perhaps unavoidable imperfection in our operative procedures.

Autopsies are on record at which none of the local lesions which attend septic inflammation were demonstrable to the naked eye. The examination of coverslips, however, made from a small amount of fluid in the pelvic cavity, has shown that organisms were present in large numbers, and culture tubes inoculated with the same fluid gave the characteristic growths. Experiments have shown that the poisoning resulting from a peritoneal infection is sometimes so intense as to cause death before the appearance of any marked local reaction in the peritoneum itself. In the fatal cases in which it has been

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impossible to secure a complete autopsy, even in which during life the ordinary symptoms of such a condition were absent, we have not the right to state positively that death was not due to septic infection.

One frequently reads in the literature reports of patients dying of intestinal obstruction or intestinal paresis following abdominal operations. The obstruction in the great majority of cases was not present before the operation, and if such a condition follows immediately afterwards or within several weeks of the operation, we cannot feel sure that the condition has not occurred as the result of an infective agent, introduced or set free at the time of operation, without having excluded this by a careful microscopic examination of the exudate.

But, besides serving as a means of correcting our errors and making us even more careful in our operative technic, it seems to me that the fact that such untoward symptoms are not infrequently associated with the presence of septic infection affords us valuable indications for treatment. My recent experience certainly has led me to the opinion that in many cases, in which the patient, after operation, does not progress satisfactorily, the abdomen should be reopened and irrigation should be freely employed.

Occasionally we can accomplish all that is necessary by opening the vagina behind the cervix, separating adhesions and washing out the lower portion of the pelvis with salt-solution and afterwards employing a gauze drain. In most cases I prefer, however, to employ the abdominal route, since I believe that in this way it is possible to separate adhesions to much better advantage, while at the same time one can sponge out any fluid or other material that may have accumulated in the pelvis and carry out irrigation to better advantage.

It has therefore become my custom whenever a patient complains of frequent attacks of pain in the abdomen or of pain that is more or less persistent, with or without marked distention, throughout convalescence, or even when these symptoms begin after the patient seems to all practical purposes to have recovered from the operation, to try for a short time the measures that are ordinarily carried out for the relief of such conditions, and then if improvement does not speedily take place, to reopen the lower angle of the incision, gently separate adhesions, freely irrigate the pelvis with sterile normal salt solution and finally introduce a piece of gauze for drainage.

Even in some instances in which the temperature is practically normal

and the pulse not over 90 and no vomiting is present, but in which the abdominal pain persists or is so marked that it requires the use of morphin to relieve it, I believe that we should irrigate and drain as soon as possible, particularly in the case of those patients who cause us anxiety by seeming better one day and worse on the next. When the abdomen becomes distended from the very first and when the bowels are not relieved by the usual methods, and the patient is surely getting weak or not improving, I do not think that we should waste any time before reopening the incision and washing out the pelvis thoroughly. Even in those cases which have already been drained, if the temperature and pulse become much increased,even though we may not have vomiting and distention to contend with, I believe we should wash out and establish our drainage afresh. The drainage-tube or the gauze drain may not suceed in carrying off the material which is producing the symptoms and yet in such cases we may succeed in washing it away by irrigation. Even in the most desperate cases thorough irrigation and drainage can never do harm and the good results which may follow the procedure are sometimes simply astonishing. The secondary operation will not, in the majority of cases, shock the patient to any extent as all the necessary measures can be carried out while she is in bed. The lower angle of the wound should be reopened, a two-way catheter carried down to the lower portion of the pelvis and irrigation with sterile normal salt-solution can then be carried out.

In cases in which the symptoms are not so urgent, that is, when the pulse is not over 120, I do not hesitate to give the patient a small amount of ether in the operating-room, and then thoroughly explore the pelvic cavity through the line of incision, in order to let out any fluid that may have accumlated. At the same time any adhesions that may be binding down some portion of the intestine are generally separated. After this I irrigate with large quantities of sterile salt-solution and introduce gauze drainage.

The following cases will be of interest in demonstrating the conditions met with and the treatment that was carried out in the individual cases.

Case I—Porro-Cesarean Operation for Large Interstitial Myoma Obstructing the Pelvic Canal

On the third day the pulse rose to 125 to the minute and the temperature to 102° F. There was at the same time some slight abdominal distention. The bowels were thoroughly well opened. The pulse increased in frequency to 140 and ranged between this and 160. The temperature by the mouth was

102.5° F. Seeing that the patient was assuredly getting worse, I determined to open the lower angle of the incision and to irrigate the pelvis and institute drainage. This I did on the evening of the fourth day without anesthesia while the patient was in bed. On opening the lower angle of the wound a small amount of bloody fluid escaped. The pelvis was then thoroughly irrigated with salt-solution and a strip of gauze was introduced into the cavity of the pelvis. The pulse after this gradually decreased and the temperature also came down somewhat. The pelvis was irrigated daily for two weeks with Thiersch's solution and a fresh strip of gauze reapplied each time. The patient's general condition improved but the pulse remained at or above 120 most of the time. Two weeks after this the pulse increased to 140 and the temperature ranged between 102.5° and 104° F. Having decided that we had not sufficient drainage I made a thorough opening through the posterior vaginal vault and thus established a communication with the opening from above. This was done with the patient under an anesthetic and although she remained in a critical condition for about 12 hours after this procedure she then began to steadily improve; the temperature and pulse soon became normal and the patient made a thorough convalescence and is now perfectly well. In this case we had in all probability to deal with a localized septic infection which had not progressed to the formation of pus. We made many cover-slip examinations from the secretion in the pelvis, and also inoculated agar-agar tubes and only on one occasion were we able to demonstrate the presence of the *staphylococcus pyogenes aureus*. It seems justifiable to assume that this woman would have succumbed to the septic infection had we not opened the abdomen early and thus reduced the amount of toxic material that was being absorbed. The opening through the vagina undoubtedly allowed of a more thorough escape of the pent-up inflammatory material.

Case II — Double Salpingo-Opohorectomy for Interstitial Myoma of the Uterus

The tumor was about the size of a child's head, spreading out between the layers of the broad ligament and extending close to the pelvic wall on either side. The patient had suffered a great deal from menorrhagia and metrorrhagia. Dilatation and curetment had been carried out with some benefit.

Owing to the weak condition of the patient I decided not to expose her to the risks attending a hysteromyomectomy, which would have been con-

siderable on account of the fixation of the tumor in the pelvis. The tubes and ovaries were removed without any special difficulty. The abdomen was then closed without drainage.

The third day after the operation the patient began to complain of intermittent attacks of sharp pains in the lower portion of the pelvis, which were referred to the left side. Her temperature and pulse were practically normal and the bowels had been opened daily after the second day without any difficulty. On the 10th day after the operation the pain in the lower abdomen began to be so severe that it was necessary at times to give her anodynes. On the 12th day the lower angle of the wound was reopened down to the peritoneum, as there seemed to be some slight skin-infection at this point, and a very small amount of purulent fluid escaped from this part of the incision, but at no other point of the incision could any pus be discovered. Coverslip and cultural examination of the pus showed the presence of the skin coccus. After this, at intervals of every three or four days, the patient would have sharp attacks of pain in the lower abdomen, with at times some slight elevation of the temperature and quickening of the pulse. At the end of the third week the temperature one evening rose to 103° F. and the pulse to 120. At the end of the fourth week she seemed to be very much better in every way as she had not any elevation of temperature, and the pulse rate being about 100, and as there had been but very little pain for over a week, she was allowed to be taken to her home. I told her at the time that I did not think it wise for her to go under the circumstances, but as she and her family insisted upon it, it was impossible for me to keep her in the hospital any longer. After she had been at home two weeks she began to have these same periodical attacks of pain in the lower abdomen; these were accompanied with some distention particularly referable to the left lower zone of the abdomen at a point corresponding to the position of the sigmoid flexure of the colon. At this point a marked bulging could be observed which sometimes attained the size of the closed fist and appeared to be very hard; on percussion a tympanitic note could be generally elicited over this area. This condition of affairs kept up for two weeks and a half longer with the attacks occurring at intervals of about every week or ten days, and after each attack the patient seemed to be more prostrated and the general condition more unfavorable. I concluded that there certainly must be some localized septic process which was gradually involving a considerable portion of the intes-

tines as well as of the tissues in the lower part of the abdominal cavity. By vaginal examination one could detect a distinct sense of induration of the left broad ligament but no points of tenderness and no fluctuation. Having determined that there must be some dense adhesions binding down the intestines and also that the localized inflammation was spreading in all probability from an infected left pedicle, after consultation with her attending physician, I decided to first puncture through the posterior wall of the vagina, in order to allow any fluid that might be present to escape, and to separate any adhesions. If this were found not to be satisfactory I was then prepared to open the abdomen and separate the adhesions from above and to institute drainage. The patient having been anesthetized and placed on the table the posterior vault of the vagina was opened, but no fluid escaped nor could the parts be satisfactorily felt. I therefore reopened the incision and found the omentum slightly adherent to the line of incision, and also to the upper surface of the uterus; but even there no bloody fluid or other accumulation, so far as one could detect, escaped. I then separated some intestinal adhesions, and also freed the portion of the intestine that was attached to the pedicle on the left side. The knuckle of intestine which corresponded to the bulging mass that had been detected through the abdominal wall seemed (in the hurry of the operation) to be the upper portion of the sigmoid flexure of the colon, and this suggested to my mind at the time that there was some accumulation of fluid at this point; I therefore punctured the intestine with the exploring needle but with negative results. I then separated the adhesions around this place and washed out the lower portion of the abdominal cavity with several liters of sterile salt-solution at 112° F., and introduced a considerable quantity of gauze for purposes of drainage. During the progress of this secondary operation the patient seemed to be in a condition of collapse for a considerable portion of the time, and everything was done as quickly as possible. Hypodermics of strychnin were given at intervals of every few minutes during the operation and were kept up for some time after. As soon as she began to recover from the anesthetic, the breathing was stimulated by inhalations of oxygen which seemed to improve her shallow respirations and also to stimulate the circulatory apparatus. This was kept up at regular intervals for the first 24 hours, and together with the hypodermics of strychnin and brandy, and with nutritive enemeta seemed to greatly improve her condition. The temperature never went up above normal after this operation and the pain

never returned. Her mental condition became unbalanced for a few days during the first week, but these symptoms soon disappeared and the patient made a prolonged but thoroughly satisfactory recovery. I fully believe that had I not opened the abdomen she surely would have died of a chronic peritonitis which though localized was gradually but surely spreading. This secondary operation was performed six weeks after the primary operation.

Case III—Operation for Densely Adherent Tubes and Ovaries the Result of Infection following an Induced Abortion

The tubes and ovaries on both sides were low down in the pelvis especially on the right side and were intimately attached to the broad ligaments. It would have been almost impossible to separate the right tube and ovary from the broad ligament without practically tearing them out. I therefore tied the ovarian artery close to the pelvic wall and also the anastomosing branches of the uterine and ovarian arteries near the cornu of the uterus. I then dissected out the tube and ovary from the broad ligament on this side. On the left side the tube and ovary were also densely adherent but they were removed after separating some dense adhesions.

The abdominal cavity was irrigated with salt-solution and sponged dry and the abdomen closed without drainage. Convalescence immediately following, the operation was perfectly satisfactory with the exception that she complained of some pain in the right lower portion of the abdomen. It was, not, however, sufficient to require the administration of any anodyne. On the 10th day following the operation the pains began to be more intense in the lower part of the abdomen and at times she would have some slight distention, especially marked on the right side. The bowels were acting thoroughly well all during this time and the temperature was never above 100° F. the pulse being usually between 80 and 100; there was no vomiting. On the 11th day she began to complain of considerable pain in the lower abdomen, which on the 12th day became still more marked. On the 11th day by vaginal examination I could not detect anything abnormal in either broad ligament, but on the 12th day I made another examination and could then distinctly make out an indurated and fluctuating condition of the right broad ligament. The pulse at this time was between 90 and 100 and the temperature between 99° F. and 100° F. On account of the constant exacerbation of the pain and on account of the increasing distention it was determined to

reopen the abdominal wound, to thoroughly irrigate the abdominal cavity and to institute drainage. I started to open the abdomen under cocain but found that the manipulation produced so much pain that I was obliged to give the patient an anesthetic. As soon as the abdominal cavity was opened a considerable amount of a chocolate colored fluid escaped. I separated several adhesions binding the intestines to each other on the right side and also set free the intestines which were adherent to the uterus. The pelvis was thoroughly washed out with several liters of sterilized salt-solution, and gauze drainage was introduced down to the cul-de-sac and brought out at the lower angle of the incision. The abdomen was closed, the usual dressings were applied and the patient placed in bed again, the pulse being about 130. After this operation the pain entirely disappeared and the pulse gradually came down to its normal condition. The patient from this time steadily improved and is now perfectly well.

Case IV—Abdominal Section Performed for Left Parovarian Cyst the Size of a Cocoanut, with a Densely Adherent Right Tube and Ovary

The tube contained pus. The operation was performed in the usual manner and the abdomen was closed without drainage. The patient's convalesence up to the 10th day, was perfectly normal, but she then began to complain of sharp pains in the lower abdomen. During the next three days it was necessary to apply flaxseed poultices locally and to administer hot vaginal douches in order to relieve the pains. The pain, however, was so persistent that it became necessary to give her morphin hypodermically. The pulse and temperature during this time were about normal and there was no vomiting. As the pain persisted and as some slight distention appeared in the lower abdomen I determined to institute drainage by the vagina. The patient was anesthetized and an opening was made into the peritoneal cavity through the posterior fornix of the vagina. After some adhesions had been separated a sac in the left broad ligament was entered. I could not determine the exact nature of this enlargement but my fingers were evidently in a cavity which I took to be formed by the folds of the broad ligament. Irrigation of this cavity and of the pelvis through the opening made in Douglas' pouch and the employment of gauze drainage relieved the patient of any further pain and her condition greatly improved, so that at the end of four weeks she left the hospital. She returned the following autumn complaining

of more or less pain in the lower abdomen which, however, was not so constant as after the first operation. On careful examination some induration in the left broad ligament could be made out. I therefore advised her to have the adhesions separated thinking that in this way she might be relieved entirely. I opened the abdomen and found in one place the intestines adherent to the left broad ligament and to each other. The omentum was also adherent to the uterus and to the intestines in several places. I released the adhesions but during the manipulation the outer coat of the intestine was stripped off in several places, making it necessary to apply sutures. The pelvis was then thoroughly washed out with salt-solution and the abdomen closed without drainage. It is now six months since the last operation and the patient is perfectly free from pain and in every way is in a very satisfactory condition.

Case V—Operation for a Densely Adherent Multilocular Cystoma of the Left Ovary with Chronic Adherent and Much Enlarged Fallopian Tube and Densely Adherent Right Tube and Ovary

The intestines were adherent to each other in many places, also adherent to the tumor mass on both sides. The left tumor mass was densely adherent to the rectum posteriorly. The omentum was adherent to the uterus and also to the tumor masses on either side. The mass on the left side was separated, after a great deal of difficulty, from the pelvic wall, but it could only be removed in pieces. It was so thoroughly incorporated with the broad ligament that it was found necessary to tie off the broad ligament on this side by means of interrupted sutures. On the right side in separating the adhesions the ovarian artery was ruptured, necessitating its immediate ligation.

The abdomen was irrigated thoroughly with sterile normal salt-solution and gauze drainage employed in the lower angle of the incision, as there seemed to be a considerable amount of oozing. On the day following the operation the condition was satisfactory; the pulse was 130 and the temperature practically normal. The second night the pulse began to increase in frequency and the temperature also began to rise rapidly. Thirty-six hours after the operation the pulse was between 150 and 165, of poor volume and at times extremely difficult to count. The temperature by the mouth was 104.5° F. She began to be very restless and her condition was anything but favorable. I decided to reopen the wound at once and to wash out the pelvic cavity thoroughly with salt-solution and reapply the drainage. In remov-

ing the gauze that had been in the abdomen a considerable amount of bloody secretion escaped. The abdominal cavity was irrigated with several liters of sterile salt-solution, through a two-way catheter. As this instrument could be carried down into the curve of the pelvis, the lower portion of the pelvis was readily washed out. Some fresh sterile gauze was then introduced. The temperature began to fall immediately after irrigation of the abdomen, so that by 8 o'clock the next morning (eleven hours after the operation) it was down to 100° F., the pulse at this time being about 145 to 150. I then washed out the abdomen again in the same manner and kept up stimulation by hypodermic injections and by nutritive enemata. The abdomen was slightly distended but there was no vomiting. The temperature the next evening went up to 102° F. and the pulse to 144. After this the temperature steadily decreased to normal and she is now perfectly well.

I consider that this case shows very well the beneficial results of cleansing the pelvis soon, without waiting for the patients system to become thoroughly prostrated from the toxic effects of the material that was in the abdominal cavity. I feel convinced that she was absorbing a specific poison into her system which she was not able to withstand; and the improvement following the irrigation of the pelvic cavity was so rapid and so marked that there can scarcely be any doubt as to the correctness of these conclusions.

No matter how careful our technic, we must be prepared and expect to meet with a certain percentage of such unsatisfactory cases in our abdominal work. But if we do not hesitate to reopen the abdomen early, or in some cases even late, a considerable number of cases that would otherwise die may, I feel sure, be saved.

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